

Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Role of nitrogen metastable states in the removal of formaldehyde by non-thermal high pressure N_2 and N_2/O_2 mixture plasmas N. BLIN-SIMIAND, F. JORAND, L. MAGNE, S. PASQUIERS, LPGP-CNRS-UPS, Orsay, France, DIREBIO TEAM — Formaldehyde is one of the most toxic VOC coming from human activities. Few works have been performed in order to understand mechanisms involved in the removal of this molecule in air using non-thermal plasmas generated by pulsed discharges, most often dielectric barrier (DBD) or corona ones. Even in the N_2/CH_2O mixture, a comprehensive kinetic interpretation of measurements remains not so easy because it requires a self-consistent modelling of both the streamer physics and the strongly reactive plasma chemistry. This difficulty can be overcome in case of a spatially homogeneous plasma. So our study deals with the removal of CH_2O (max. 900 ppm) in N_2/CH_2O mixtures using : i/ a DBD energised by a pulsed high voltage power supply, at 1 bar, and ii/ a photo-triggered discharge at 400 mbars. The removal efficiency is the highest for the homogeneous plasma. Effect of the addition of a small amount of O_2 is examined in case of the photo-triggered reactor, in order to get more consistent information on the role of the nitrogen metastable states in the decomposition of the pollutant molecule. It is shown that quenchings of N_2 states by CH_2O play an important role, which is progressively counterbalanced by the oxidation kinetic when O_2 is added to the mixture.

N. Blin-Simiand
LPGP-CNRS-UPS

Date submitted: 27 May 2010

Electronic form version 1.4